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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/805,596

03/19/2004

Daniel L. W. Chieng

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EXAMINER

YAARY, MICHAEL D

ART UNIT

PAPER NUMBER

2193

MAIL DATE

DELIVERY MODE

11/09/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/805,596

Applicant(s)

CHIENG ET AL.

Examiner

Michael Yaary

Art Unit

2193

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 19-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 19-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-16 and 19-23 are pending in the application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 7, 10-14, 19, 22, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams et al. (hereafter Adams)(US Pat. 5,471,411) in view of Konishi et al. (hereafter Konishi)(US Pat. 4,727,505).

4. **As to claim 1**, Adams discloses a method comprising:

Storing a plurality of sets of filter coefficients in a memory (abstract and column 4, lines 32-35);

Selecting a first one of the sets of filter coefficients (column 6, lines 53-59 and column 7, lines 6-21);

Interpolating the first selected set of filter coefficients (column 4, lines 54-57).

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5. Adams does not disclose convolving the interpolated first selected filter coefficients with an input signal to produce a filtered output signal.

However, Konishi discloses convolving the interpolated first selected filter coefficients with an input signal to produce a filtered output signal (Column 7, lines 27-37 disclose in a digital processor the convolution of an input signal with appropriate coefficient data.).

6. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Adams, by performing the convolution operation, as taught by Konishi, for the benefit of dealing with signals containing a large number of high-frequency components, as well as providing a convolution arithmetic circuit suitable for real-time processing of digital signals.

7. **As to claims 2-4 and 12-14, and 23**, the combination of Adams and Konishi do not disclose the input signal comprises an audio signal, the input signal is convolved in a sample rate converter of a digital audio amplifier, and the sample rate converter is implemented in a PWM amplifier. Examiner is taking official notice that using an audio signal as input, convolving in a sample rate converter of a digital audio amplifier, and implementing in a PWM amplifier was well known in the art at the time the invention was made.

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8. Therefore, it would have been obvious to one of ordinary skill in the art the time of the invention to modify the teachings of Adams and Konishi, by using the well known knowledge of an audio signal as input, convolving in a sample rate converter of a digital audio amplifier, and implementing in a PWM amplifier for the benefit of converting from one sample rate into another sample rate and completing filter operations. Motivation to implement this well known knowledge can be found in that audio or image signals are well known in the art to be used for filtering into an output signal and that PWM amplifiers are often used in telecommunications and audio signals as a method of reducing the total amount of power delivered.

9. **As to claim 7 and 19**, Adams further discloses the plurality of sets of filter coefficients are stored in a single memory (Column 4, lines 32-35).

10. **As to claims 10 and 11**, the claims are rejected for the same reasons as claim 1 above.

11. **As to claim 22**, the claim is rejected for the same reasons as claim 1 above.

12. Claims 5, 6, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams in view of Konishi and further in view Thompson (US Pat. 5,928,313).

13. Thompson was cited in the previous office action dated 06/11/2007.

14. **As to claims 5 and 15**, the combination of Adams and Konishi do not disclose selecting the first one of the sets of filter coefficients comprises reading a value stored in a filter selection register and selecting the first one of the sets of filter coefficients based upon the value.

However, Thompson discloses selecting the first one of the sets of filter coefficients comprises reading a value stored in a filter selection register and selecting the first one of the sets of filter coefficients based upon the value (column 7, line 56-column 8, line 7).

15. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Adams and Konishi, by reading a value stored in a filter selection register and selecting the first one of the sets of filter coefficients based upon the value, as taught by Thompson, for the benefit of utilizing the hardware as being fast enough to process incoming samples in real time.

16. **As to claim 6**, Thompson discloses changing the value in the filter selection register to a new value and selecting a new one of the sets of filter coefficients based upon the new value (column 8, lines 7-19).

17. **As to claim 16**, Thompson discloses the filter selection register is configured to allow modification of the filter selection value (column 8, lines 7-19).

18. Claims 8, 9, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adams and in view of Konishi and further in view of Auld et al. (hereafter Auld)(US Pat. 6,411,333).

19. Auld was cited in the previous office action dated 06/11/2007.

20. **As to claims 8, 9, 20, and 21**, the combination of Adams and Konishi do not disclose the first selected set of filter coefficients are interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter coefficients.

However, Auld discloses first selected set of filter coefficients are interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter coefficients (column 11, lines 46-50).

21. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Adams and Konishi by having the first selected set of filter coefficients be interpolated according to a cubic spline algorithm, and each of the plurality of sets of filter coefficients comprise polyphase filter

coefficients, as taught by Auld, for the benefit of effectively interpolating multi-dimensional data.

Response to Arguments

22. Applicant's arguments with respect to claims 1-16 and 19-23 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Yaary whose telephone number is (571) 270-1249. The examiner can normally be reached on Monday-Friday, 8:00 a.m - 5:00 p.m..


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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